

We claim:

1. A dispersion compensation module for an optical communication system having an operating bandwidth, comprising:

5 an input port;

an output port; and

at least one predetermined length of dispersion compensating fiber connected to the input port and the output port, the dispersion compensating fiber being designed to have a wavelength-dependent dispersion inflection point at a wavelength near the
10 operating bandwidth of the optical communication system.

2. A dispersion compensation module according to claim 1 wherein the dispersion inflection point is within the operating bandwidth.

15 3. A dispersion compensation module according to claim 1, wherein the predetermined length of dispersion compensating fiber comprises a plurality of separate lengths of dispersion compensating fiber spliced together.

4. A dispersion compensating fiber for use in an optical communication
20 system, wherein the dispersion compensating fiber is designed to have a relative dispersion curve that substantially matches a relative dispersion curve of a transmission fiber over a wavelength bandwidth.

5. A dispersion compensating fiber according to claim 4 wherein the wavelength bandwidth is more than 40 nm.

6. A dispersion compensating fiber according to claim 4, wherein the dispersion compensating fiber comprises a first dispersion compensating fiber and a second dispersion compensating fiber, each of the first and second dispersion compensating fibers having a relative dispersion curvature so that a combined dispersion curve of the first and second dispersion compensating fibers substantially matches the relative dispersion curve of a transmission fiber.

7. A dispersion compensating fiber for controlling residual dispersion in a transmission fiber, wherein the dispersion compensating fiber has core and cladding regions designed to provide a dispersion having a wavelength dependence inflection point at a wavelength near an operating transmission wavelength region.

8. A dispersion compensating fiber according to claim 7, wherein the inflection point is in a specified bandwidth about the operating transmission wavelength.

9. A dispersion compensating fiber for a transmission fiber operating in a bandwidth, the dispersion compensating fiber comprising a core and cladding region comprised of two or more segments, each segment having inner and outer radii and a relative refractive index difference, $\Delta\%$;

wherein the radii and $\Delta\%$ for each segment are chosen to provide the dispersion compensating fiber with a dispersion having an inflection point at a wavelength near the operating transmission wavelength.

5 10. A dispersion compensating fiber for controlling residual dispersion in a transmission system, wherein the dispersion compensating fiber has a core and cladding region designed to provide a relative dispersion slope that substantially matches a relative dispersion slope of a transmission fiber over at least a 40nm wavelength bandwidth near an operating transmission region.

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11. A dispersion compensating fiber according to claim 10, wherein the relative dispersion slope in the dispersion compensating fiber intersects with the relative dispersion slope of the transmission fiber at two points near a 1.55 μm transmission wavelength.

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12. A dispersion compensating fiber to compensate for dispersion in a transmission fiber, the dispersion compensating fiber comprising core and cladding regions comprised of two or more segments, each segment having inner and outer radii and a relative refractive index difference, $\Delta\%$;

20 wherein the radii and $\Delta\%$ for each segment are chosen to provide the dispersion compensating fiber with a relative dispersion slope that substantially matches a relative dispersion slope of the transmission fiber near the operating region.